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HIGH TECHNOLOGY MARKETING

Building a better high-tech mousetrap does not necessarily mean customers will beat a path to your door. On the contrary, the state of the technology is not enough to survive in a competitive industry. Corporate leaders nationwide are discovering that their most powerful competitive weapon is marketing—product development, pricing, distribution, promotion, and marketing research. Such high-tech products as advanced weaponry, robotics, computers, engineered materials, biochemicals, and advanced medical equipment must be marketed more effectively. One major problem facing the high-technology firm is the shift from being supply-side oriented to demand-side oriented: when early firms represent the only option to the buyer, the industry is less competitive; when additional competitors enter the market and the industry becomes more competitive, buyers have much more power in determining the success of a given firm. Early market share leaders, often small entrepreneurial organizations, are unable to cope with the large corporations which are attracted to the industry. Shanklin and Ryans (1) have found that many pioneering firms in any new industry tend to be "shaken out" at this critical evolutionary stage. A case in point is the recent competition between Microsoft and Netscape and such corporate giants as AT&T and IBM. The early market leaders have found that they can no longer rely on research and development (R&D) expertise and are recruiting marketing talent to compete on the buying and selling battlefields. In high-technology industries, where overcrowding has slowed growth and technological advances have produced product lines that differ only slightly, major companies have begun to sell less tangible commodities instead. Firms are considering such aspects as brand awareness, product reliability, and company service to lead their strategic portfolio.

In a recent study, high-tech managers ranked "product image" as the most important tool in their strategy (2). Several large firms have recently restructured their organizations or have made strategic personnel decisions which have paved the way for greater emphasis on the marketing function. Atari and Apple Computer, for example, raided the well-trained marketing talent at Pepsico and Phillip Morris to find chief executives. Bethlehem Steel hired a top marketing executive away from master marketer General Electric to head its reorganized marketing department, and Armco is bringing in a marketing consultant to counsel its top executives. AT&T used to develop new products based on its latest technological advances, ignoring the needs of customers. But recently, AT&T reorganized its technologies subsidiary, creating separate divisions for each product—complete with sales and research-and-development departments.

Inasmuch as there is a growing awareness of marketing as potentially providing benefits to new and established companies, chief executive officers are evaluating the role of marketing within their operations. Varying opinions exist among executives: some companies perceive the task of marketing high technology to be similar to selling products such as soap powders or designer jeans; others see the talk of marketing high technology as different from consumer products; and still others have not altogether accepted the notion of using marketing as a tool.

Given the rapid growth in high-technology development, particularly in the computer hardware and software industries, it is valid to question whether or not traditional marketing techniques are appropriate for marketing high-technology products and services. What is the nature of high-technology products and services? How does marketing high-technology products and services differ from marketing consumer goods? Are high-tech products and services significantly different from more traditional business and industrial products and services?

High-technology products are uniquely different from traditional industrial products and services. Characteristics such as high complexity, high cost, high service requirements, and shorter product life-cycles can necessitate different marketing techniques or at least a refocusing of traditional techniques. Acknowledging the uniqueness of the marketing task for high-technology products and services represents only the threshold of discovery. Given that the general knowledge of marketing traditional industrial products and services is in the early stages of development, the prudent approach to a discussion of marketing high-technology products and services should include a thorough review of the fundamentals of marketing more traditional business and industrial products and services. This review should contrast business and industrial marketing with consumer marketing, highlighting similarities and differences. Because of the lack of clear delineation between consumer and industrial products and services in such industries as computer hardware, the difficulty in identifying appropriate marketing strategies is compounded. Some executives are uncomfortable dealing directly with the ultimate consumer and their oftentimes emotion-laden buying motives.

Growth of High-Technology Services

The growth of high-technology services firms has accentuated the differences between product and service marketing. Questions such as, what is the nature of a service? and what type of relationship does the service organization have with its customers? lead to defining appropriate marketing approaches. Consumers do not buy new technologies; they buy the expectations of benefits those technologies bring to them. During the industrial era, our basic resources were tangible things which could be mined, processed, bought, sold, managed, depreciated, such as coal, oil and steel. When a customer purchases a service, he/she is purchasing an intangible. This intangible quality creates a problem in that it is difficult for the service firm to demonstrate the benefits prior to performance (3).

What Is the Nature of a Service?. A service has been described as a deed, act, or performance (4,5). Lovelock (4) has categorized services into four groups based on two fundamental issues: at whom is the act directed, and is this act tangible or intangible in nature. His four-way classification includes (1) tangible actions to people's bodies, such as airline transportation, haircutting, and surgery; (2) tangible actions to goods and other physical possessions, such as air freight, lawn mowing, and janitorial services; (3) intangible actions directed at people's minds, such as broadcasting and education; and (4) intangible actions directed at people's intangible assets, such as insurance, investment banking, and consulting (4,6).

What Type of Relationship Does the Service Organization Have with Its Customers?. In the service sector purchasers enter into an ongoing relationship with service suppliers and receive a service on a continuing basis (4). Clients need to have confidence in the person or organization from which they are going to buy a service, especially when special skills are required and when the service rendered involves personal risk for the client. Sales has been the most successful promotional tool. In high-technology services the seller–buyer relationship takes on a special significance. Generally, the seller should be represented by the professionals who can provide the technical service. The technical management often becomes directly involved in the sale/service delivery (3).

Dunn (3) offers a discussion of the marketing and sales approaches for high-tech services. He shows that the leading companies have advanced through three marketing stages: (1) professionals-who-sell approach, (2) professional sales force approach, and (3) the programmed management approach. The first state is found in the newly founded service companies. Typically, the one or two people who invented the service function are the sales force. This approach limits growth to the efforts of key officers. In order to grow rapidly, "sales types" need to be hired to augment the capability of the entrepreneurs.

The second stage is the "professional sales force approach." Unless the sales force is extremely well trained in the high-tech knowledge, this approach can be very costly because the sales force might require extensive technical back-up which dilutes the original plan to free up the technical/management personnel.

The third stage considered to be the emerging model of management in high-tech service industries is the "programmed management approach" [3, p. 19]. This approach is primarily a system of early customer profiling, the use of advertising and direct mail to customers, and the late release of technical resources.

Tools of Marketing

Marketing is defined as "the performance of activities which seek to accomplish an organization's objectives by anticipating customer or client needs and directing a flow of need-satisfying goods and services from producer to customer or client" [7, p. 8]. By flow, we generally refer to the physical movement of the product, the financial transaction and ownership flow, and the communication flow which included promotional messages directed toward customers, and information gathered from customers in the form of market research, complaints, and requests.

The mention of "to satisfy customers" reflects the focus of the "marketing concept." The marketing concept states that the fundamental objective of the organization should be customer satisfaction. All activities of the organization should be devoted to identifying, and then producing, services and products to satisfy customer's wants. In 1957, J. B. McKitterick, former president of General Electric Company, commented that "...the principal task of the marketing function... is not so much to be skillful in making the customer do what suits the interests of the business as to be skillful in making the business do what suits the interest of the customer" [8 p. 3].

In order to implement the marketing concept five tactical elements are utilized. These elements are called the "marketing mix." The marketing mix includes the four traditional strategic elements known as the four P's of marketing: price, product, place, and promotion. In addition, a fifth P of marketing—probe—is utilized to incorporate marketing research as a strategic element. Probe is the use of marketing research as an active decision variable suggesting a direct effect upon market demand. The two-way flow of research information is extremely important to the high-tech marketer. These five tactical elements are used to implement the strategic plan for the high-technology product or service.

As with all types of products and services, each of the strategic elements of the marketing mix plays a major or a minor tactical role contingent upon the situational characteristics and environment of the product or service. For example, highly technical products and services which have diverse applications require the skilled and flexible explanations that only a sales representative can provide. In contrast, products and services which require little explanation, as often is the case with standardized consumer packaged goods, such as chewing gum, soda pop, breakfast cereal, and the like, benefit less from personal selling and more from repetitive mass advertising messages. Generalizing about the use of marketing tools—product, price, place, promotion, and probe—is not an easy task, since each of the marketing situations faced by firms is unique. The common denominators for high-technology products and services are the characteristics of high complexity, high cost, shorter product life cycle, and the need for reliable continuous service. Each of the tools of marketing are discussed in the following section from the perspective of the high-tech marketer.

Product. It goes without saying that the product concept must be viable and pretested before commercialization. Careful attention should be devoted to quality control and scheduling. While it is not uncommon in high-tech marketing for demand to very quickly surpass supply, caution should be exercised to assure that manufacturing capability and flexibility exist such that products and services are available. Empty promises can destroy the customer confidence in the reliability of the manufacturer—a very important element in maintaining continued relationships.

Product plans should include provisions for product and service-line extensions: new uses and applications and attention to new segment of the market. High-tech marketers should anticipate price cutting within competitive industries. Manufacturing cost reductions and prudent purchasing can generally avoid too much distress: plans should provide for dropping products from the line at specified poor profit margin points.

Studies have found that high-tech firms are engaged in new product development at a higher rate than other organizations, as evidenced by their higher expenditure rates on R&D (9,10,11,12). The process of product innovation, however, is more than just expenditures on R&D: product innovation encompasses the successful efforts to bring the product to market as well. Product innovation can widen the market and hence promote industry growth and/or it can enhance product differentiation. Crawford (13) defines innovation as the process that embodies an invention in a form by which it can be utilized; it is the result of the work required to make the invention useful or practical. The highly innovative firm should be inventive and strong in marketing the new products and services as well.

Some firms are more innovative than others. The degree of innovativeness has been addressed by many managers and researchers (1,12). While a discussion of the various paradigms are beyond the scope of this paper, the innovativeness dimension is characterized by varying degrees of aggressiveness in R&D expenditures, higher risk and, in general, a more creative and outward-looking attitude (12).

A recent study conducted by Traynor and Traynor (12) indicates that the high-innovation, high-tech firms tend to be more aggressive, take higher risks and, in general, possess a more creative and outward-looking attitude, as evident in their expenditures on strategic and promotional factors (see Table 1). The high innovative firms rated having state-of-the-art technology higher than any strategic factor—6.5 out of a possible 7.0. This rating acknowledges the commitment of high-innovation firms to technology development. Product image is also a major priority of the high-innovation firm. The medium- and high-innovation firms ranked product image as extremely important as a strategic factor, while the low-innovation firms did not rank product image as important.

Price competition, however, was not viewed as important by the high-innovation firms. While the medium-innovation firms ranked price competition as third and the low-innovation firms ranked price competition fourth out of twelve possible strategic factors, the high-innovation firms ranked this factor as the seventh most important factor within their competitive strategy. Completeness of product line and the reputation of the firms' distributors was also ranked as a higher priority to the high-innovation firms. The medium- and high-innovation firms gave more import to the promotional strategic factors, ranking personal selling, advertising and media employed, the creativity of the advertising message, and employing a competent advertising agency as much more important elements within the firms' strategy. Finally, having strong patent protection was deemed much more important to the medium- and high-innovation firms.

A similar pattern was found when the top managers' perceptions of the importance of promotional methods to the firms' success were analyzed. Once again, the high-innovation firms—and, in some instances, joined by the medium-innovation firms—maintained a much more aggressive posture in their perception of promotional methods. The medium- and high-innovation firms viewed advertising in trade magazines as more important than did the low-innovation firms. But perhaps the most telling differences were found in the use of sales promotional materials, direct-mail advertising, and packaging. These media are less traditional and their use might suggest a more creative and outward-looking attitude, which is consistent with the other findings of this study.

The high-tech firms' expenditures on strategic and promotional factors confirm the aggressive posture of the high-innovation firms and support the conclusion that the degree of innovativeness distinguishes high-tech firms from each other. Varying R&D expenditure levels indicate decidedly different innovation strategies. The high-innovation firms spent almost twice as much on sales and sales management activities as did the low-innovation firms. Customer service and technical support were provided at dramatically high levels by the medium- and high-innovation firms in contrast to the low-innovation firms. Similarly, advertising and trade

Table 1. How Top Managers in Different Levels of Innovation High-Tech Firms View the Importance of Strategic Factors to Their Firms' Success

	Innovation Levels				
Factors	Low Innovation ($n = 52$)	Medium Innovation ($n = 54$)	High Innovation ($n = 59$)	All Firms ($N = 164$)	F-Value
Product image	5.9	6.4	6.3	6.2	4.09^{b}
Having state-of-the-art technology	6.0	5.7	6.5	6.1	0.14
Personal selling	5.7	6.1	6.2	6.0	5.43^{b}
Having a strong service organization	5.2	5.8	5.7	5.5	3.71^{a}
Price competitiveness	5.2	5.8	4.8	5.3	12.32^{b}
Completeness of product line	4.3	5.8	5.6	5.2	20.15^{b}
Reputation of the firms' distributors	3.6	4.8	5.0	4.5	9.66^{b}
Marketing research	4.2	4.4	4.4	4.3	1.05
Advertising and media employed	3.5	5.1	4.7	4.3	10.61^{b}
Creativity of the advertising message	3.3	4.7	4.7	4.0	11.10^{b}
Having strong patent protection	2.3	4.4	3.8	3.7	14.13^{b}
Employing a competent advertising agency	3.0	3.0	4.4	3.4	6.76^{b}

Shown as mean rankings with 7 = most important to 1 = least important.
$^{a}p < .05$ level.
$^{b}p < .01$ level.

show expenditures were markedly different: consistently with the high-innovation firms pursuing a more aggressive posture.

It is apparent from the findings of this study that the degree of innovativeness plays a major role in the manner with which a firm perceives itself and allocates its resources.

Price. The price of a product is generally a reflection of the cost of materials and labor for a product or service. However, the price of a product can also be symbolic in that the price the customer pays is far more than the costs of materials and labor, and instead reflects the lack of customer knowledge of the costs and the willingness of the customer to pay the manufacturer's suggested price. In some instances, the symbolic price represents that which the customer prefers to pay for the product, from a psychological perspective. An example might be gift-giving, where people have certain predetermined amounts which they would like to spend.

The mysterious quality of price-setting—we do not know a great deal about the pricing process—creates a difficult decision for the high-tech marketer. The difficult decision is compounded if the product is a new product with no existing substitutes. Grunenwald and Vernon (14) suggest that, although establishing the price of any product or service is an important marketing decision process, there are no product categories in which it is more critical than those involving high-technology goods and services. High-technology products and services are those devices, procedures, processes, techniques, or sciences that are characterized by state-of-the-art development and have typically short and volatile lives. In these industries, the pricing decision frequently becomes the single most important factor contribution to bottom-line profits. High-technology goods and services are characterized by rapid innovation. This phenomenon creates markets with constantly, and sometimes precipitously, falling prices that are linked with ever higher levels of product performance or service.

There are basically five alternative pricing strategies: (1) high skim, (2) low skim, (3) meet competition, (4) penetration, and (5) perception pricing. Price skimming is where the price is set high in the beginning to capitalize on the novelty of the product, and often, monopolistic qualities—such as patent protection. As competitors enter the market and as the manufacturer begins to attack larger market segments, prices are lowered.

The technique of introducing a high-tech product with a very high price and then gradually lowering that price over time is well exemplified by the hand-held calculator. Calculators were introduced in the early 1970s with price tags in excess of $100 (some as high as $1,000) for even the most basic models. During the past two decades, prices were lowered such that currently, calculators of comparable performance capabilities sell for under $10. This pricing technique allows the firm to introduce its offering with a very large early profit margin that contributes to early payback of sunk costs. Clearly, competitors will be quick to enter markets that have few barriers to entry and display large profits. The innovating firm must consider the trade-off of early high profit against the risk of inviting new competitors (14).

Low skim pricing is considered a safe pricing decision. Entering the market with a price that is high, but not the highest, enables the high-tech marketer to achieve a reasonable market share, will not panic competitors, and still maintain high enough margins to provide funds for advertising and other market share maintenance tools. Pricing at approximately the industry average is called meeting competition pricing. This strategy creates harmony with competitors and should provide ample revenues if cost structures are similar to competitors who are operating successfully. Penetration pricing—which is the use of a very low market entry price coupled with aggressive promotion and distribution support—seeks to achieve very high percentages of the market upon entry. The large volume generated justifies lower margins. Perception pricing is based on the assumption that consumers hold an "image" of a product or service. Customer perceptions of product/service price are important because customers closely link price with other product or service characteristics such as quality or performance. Grunenwald and Vernon (14) suggest that this is particularly true for categories in which the customer has limited ability to evaluate the product or service offering. It is difficult, for example, to assess the quality of veterinary services in the process of embryo transportation. Frequently, customers must make purchase decisions in categories that are unfamiliar to them. This is particularly true in the area of high-technology services. For example, few people have much understanding of the technical nature of specialized consulting services performed by business professionals. The customer, in this case, uses high price as a decision criterion because he or she believes that high-quality consulting services cannot have a low price (14). General rules-of-thumb for pricing decisions are guided by such factors as the uniqueness of the product, number of potential substitutes, and pricing philosophy and objectives of the firm.

Place. High-technology manufacturers must decide between using existing distribution channels or creating new channels. With high-tech products and services it is often difficult to find distributors who have the technical knowledge and expertise to properly represent the product or service. However, trade-offs must often be made between requisite product knowledge and obtaining access to geographical regions or segments of the market. Should a firm have its own sales force, or should it contract independent sales representatives? Firms usually turn to independent representatives to economize, but they sacrifice control for somewhat reduced selling costs, because the independents represent numerous sellers and cannot be relied on to devote all their selling and servicing to the products and services of any one manufacturer. They are more likely to concentrate their efforts on the products and services that are easiest to sell, which may be a major drawback for the new, small manufacturer. However, using independent sales representatives has some important advantages, which have induced both small and large manufacturers to turn to them. They can offer advantages in costs, flexibility, and sometimes competence over a company-owned sales force.

In the past, the use of independent sales representatives was limited to small firms that could not afford their own sales forces; as these firms became larger, they naturally developed their own. But today, larger firms are also attracted to independents because of the potential cost advantage. Independents are paid on a straight commission for sales, usually 6% although it varies depending on the industry. This makes selling costs entirely variable, rising or falling with revenues. In contrast, a company-owned sales force has considerable fixed expenses, such as sales managers' salaries, home and branch office expenses, and base salaries of salespeople, plus travel and entertainment expenses. These costs remain constant whether sales are up or down. Some argue that independent sales representatives can actually provide better sales production than company salespeople. Since independents contact the same customers with products and services of a number of manufacturers, sales calls are more economical—the cost is spread across several products. These representatives may also have more stature, in their customers' view, because of the breadth of their line and the fact that they may handle several important product lines for the customer. Generally, these representatives are experienced and competent salespeople.

Promotion. Two general promotional approaches to generating demand among distributors are prevalent—push and pull strategies. A push strategy emphasizes personal selling and persuades distributors that demand is forthcoming and that the distributors should maintain available inventory. A second alternative is to advertise heavily and stimulate consumers to request their suppliers to order your product or service. This approach is termed a pull strategy.

Although promotion consists of four basic elements—(1) advertising, (2) personal selling, (3) sales promotion, and (4) public relations—the two major elements, advertising and personal selling, are discussed here. Traditionally, the marketing of technical products and services has relied heavily upon personal selling due to the high cost of technical products and services, the need for explanation and clarification in the product and service presentation, and the extra confidence and trust that is conveyed by another person's persuasive qualities. The role of advertising has been primarily to serve as the announcement of the new product or service. The importance of employing media messages to announce new product and service introductions, differentiate products and services from competitors, and accentuate hidden qualities of products and services, cannot be overemphasized, particularly since the recent shift from industrial buying to home consumption in such markets as the personal computer market and the personal financial services market.

Table 2 reports the use of promotional tools by high-tech firms (2). Not surprisingly, sales and sales management activities were rated most important followed by advertising in trade magazines and by participation in trade shows. The emphasis on sales-related activities is further supported by the findings that the average high-tech firm in the study spent 9% of its annual revenues on sales, 2.6% on advertising, and 1.8% on trade shows (12).

Executives from large firms rated sales and sales management as significantly more important in comparison with other promotional methods. Direct-mail advertising was rated higher by small firms. The large firms used newspaper advertising significantly more than the medium-sized and small firms; however, the overall importance given to newspaper advertising by all firms was not rated high. An analysis of the importance of advertising in trade magazines, technical seminars/presentations, packaging, radio, and television advertising did not reveal any statistically significant differences (2).

Personal selling has historically played a major role in the marketing of technical products and services and continues to maintain this significant position in the marketing plan, for the reasons mentioned earlier. The salesperson is able to communicate the central message of the product or service, the features and benefits, and the claims and applications. This can be accomplished in one sales call or gradually over time. The adaptability of the salesperson to the perceived salient desires of the client enables the sales message to be individualized. This personal individualized quality enhances confidence, trust, and perceptions of the reliability of the salesperson's product or service.

A good reputation is critical in high-tech selling. The sales person should maintain good records and be sure to clarify customer requirements. Accurate information must be conveyed to technical personnel. Nothing damages credibility more quickly than misunderstandings or mistakes. Obviously, a salesperson cannot stay abreast of all the technological developments in the field. Therefore, salespeople should possess a keen knowledge of where to look for the answers to questions they are unable to answer.

Service after the sale is of the utmost importance. Sales representatives should follow-up on their sales and monitor their products and services on the job. Many ideas and solutions to problems are determined after the product or service is in operation.

Table 2. Promotional Tools Used by High-Tech Firms

	Size of Firm			
	All Firms	Below $10 Million in Sales	$10–$99 Million in Sales	$100+ Million in Sales
Promotional tools	(N = 164)	(N = 58)	(N = 58)	(N = 42)
Sales/sales management	5.6*	5.2	5.2	6.2[a]
Advertising in trade magazines	4.9	4.9	4.9	4.6
Trade shows	4.8	5.0	4.1	4.6
Technical seminars/presentations	4.8	4.7	4.8	4.8
Sales promotion materials	4.5	4.0[a]	4.8	4.5
Direct-mail advertising	4.4	4.4	4.2	4.3
Packaging	2.9	2.5	3.0	3.1
Newspaper advertising	1.6	1.4	1.4	1.2
Television advertising	1.2	1.2	1.4	1.2
Radio advertising	1.1	1.1	1.2	1.0

* 7 = important, 1 = not important.
[a] $p < 0.001$.

Probe. A key success element in a highly competitive environment is the effective use of marketing research to determine customer needs. Although marketing research has been traditionally viewed as the information-gathering-and-analysis activity which is incorporated at each stage within the marketing plan, the emergence and development of the marketing concept has been changing the role of marketing research. The marketing concept is primarily the seller's response to the demands of consumers: the business must first find out what consumers want and then produce that product or service. The seller's preoccupation with what consumers want and the buyer's growing awareness of the firm's responsibility to seek consumer input is relegating the role of marketing research from one of passive analysis to a role of an active, controllable decision variable which affects consumer demand. Marketing research should serve as a two-way flow of information. In some instances, information should be gathered and analyzed to benefit the firm. In other instances, information should be gathered and analyzed to benefit the customer.

The nature of marketing research is threefold—(1) economic, (2) comparative, and (3) cooperative. Economic research includes the gathering and analysis of macro- and microeconomic indicators and their effects upon the firm. Information-gathering-and-analysis activities which monitor the competitive environment comparing the strategic posture of competitors is classified as comparative marketing research. A third classification of marketing research, cooperative marketing research, is directed at promoting sales and servicing accounts. Cooperative marketing research includes market surveys, developing forecasts for buyer, presenting sales proposals which include detailed needs analyses and problem-solution analyses. The cooperative research efforts might take the form of a sales presentation in an effort to promote the seller's product or service, or a general service provided to existing clients or potential clients. In addition, economic and comparative marketing research might be included as part of a cooperative service program for clients.

It is from the perspective of a cooperative service that the role of marketing research can be viewed as a controllable decision variable integral to the marketing mix. Several examples should serve to clarify how the marketing research variable plays an active role in the company's marketing mix. High-technology marketing is a common setting for the seller to provide or gather information in an effort to design technical equipment to be customized to the specific needs of the buyer. The overt action and procedure of the seller plays a major role in the eventual buying decision of the technical firm. John Deere is trying to recoup some of the market share in the heavy-equipment industry that it lost to the Japanese by transforming its extensive dealer network into a market research bureau. Deere hopes to find out what new equipment customers want and to test new ideas generated from within the company. Caterpillar Tractor has already a similar research network in place.

Summary

Developing the best product is not enough to compete effectively in high-technology industries. There is a growing awareness and interest in marketing as a potential source for gaining competitive advantage. High-technology products and services are unique from traditional industrial products and services and require appropriate marketing techniques. There has been tremendous growth in the service industries and this is true for high-technology service industries as well. Marketing services is different from marketing products: often services are extremely complex and intangible and require extremely well-developed sales skills to communicate service benefits and advantages to customers.

The basic tools of marketing—product, price, place, promotion, and probe (the 4 p's of marketing with the addition of probe, added to accentuate the importance of marketing research)—are appropriate when modified to reflect the unique aspects of high-tech products and services: high complexity, high cost, shorter product life-cycle, and the need for reliable continuous service.

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